example, the structure shown in FIG. 9), and defects, such as the phenomenon in which the topmost scanning line 3_1 appears as a bright line, tend to increase.

However, in this embodiment, the dummy scanning line 3_0 is arranged outside of the topmost scanning line, 3_1, parallel to the scanning line 3_1, and the pixel electrode **6** overlaps the dummy scanning line 3_0 with the inter-layer insulating film **21** therebetween. Therefore, even if the parasitic capacitance is increased to a value which is about twice that of the structure shown in FIG. **9**, all of the pixels are geometrically symmetrical about the additional capacitance line **10**. As a result, the parasitic capacitance ratio is equalized in all of the pixels, thereby certainly preventing defects, such as the occurrence of bright line due to different parasitic capacitance ratios.

Thus, in the liquid crystal display device of this embodiment, it is possible to increase the aperture ratio, restrain the alignment defects of liquid crystals, reduce the occurrence of defects such as the appearance of bright line, and achieve improved quality.

In addition, the rate of occurrence of bright line can further be reduced by inputting some signal to the dummy scanning line 3_0 of the liquid crystal display device of the above-mentioned structure. For instance, by inputting the scanning signal G_0 shown in FIG. **2** of Embodiment 1, it is possible to completely prevent the occurrence of bright line. Even when the scanning signal G_0 described in other embodiment is input, it is possible to completely prevent or reduce the occurrence of bright line.

In the above-mentioned embodiments, 1 to 6, a line of pixels corresponding to the topmost scanning line 3_1 may be hidden with a light blocking pattern, instead of providing the dummy scanning line 3_0, so as to prevent this line of pixels from affecting the display. However, in this state, if a current continues to be supplied over a long time, the appearance of bright line in the first row may gradually spread to the second row. Thus, this structure is not an appropriate measure to prevent the defects.

Therefore, in the structure where the first line of pixels is shaded from light, if the dummy scanning line 3_0 is provided like the present invention, it is possible to prevent the second line of pixels from appearing as a bright line.

Furthermore, in Embodiments 1 to 6, the dummy scanning line 3_0 is arranged outside of the topmost scanning line 3_1. However, the present invention is not limited to this structure. For instance, when the scanning of scanning signal starts from the lowest scanning line $3i$, a dummy scanning line $3i_{+1}$ is arranged outside of the lowest scanning line $3i$.

In the liquid crystal display device of the present invention, an inter-layer insulating film covering the top of switching elements, scanning lines and signal lines is formed, and pixel electrodes are formed so that the pixel electrodes overlap the dummy scanning line and the adjacent scanning line corresponding to the pixel electrodes with the inter-layer insulating film therebetween.

Consequently, since the aperture ratio is improved and the alignment defect of liquid crystals is reduced as described above, it is possible to achieve a highly reliable liquid crystal display device.

Moreover, a drive method of the liquid crystal display device of the present invention includes the step of inputting a signal to the dummy scanning line formed outside of the outermost scanning line on either the scanning start side or the scanning end side of scanning signal.

Thus, by providing a dummy scanning line and inputting a signal to the dummy scanning line, the symmetry of the

scanning line located on the outermost position on the scanning start side of scanning signal and the dummy scanning line about the additional capacitance line and the symmetry of other adjacent scanning lines about the additional capacitance line are substantially equalized, thereby ensuring higher display quality.

Additionally, the liquid crystal display devices of Embodiments 1 to 6 have a so-called Cs on Com structure in which the additional capacitance Cs between the pixel electrode **6** and the additional capacitance line **10** is formed on the common line **9**. Hence, such a liquid crystal display device can be easily driven. Furthermore, in the Cs on Com structure, since the parasitic capacitance between the gate and source lines is reduced, it is possible to decrease shadowing (particularly in a lateral direction (scanning direction)). Consequently, the present invention can achieve a liquid crystal display device which is easily driven and has high display quality as well as the effect (an improvement of reliability) produced by the above-mentioned dummy scanning line.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to one skilled in the art are intended to be included within the scope of the following claims.

What is claimed is:

1. A liquid crystal display device comprising:

a pair of substrates sandwiching liquid crystals therebetween;

a plurality of scanning lines to which scanning signals are successively applied;

a plurality of signal lines to which data signals are successively applied, said signal lines intersecting said scanning lines at right angles;

a switching element which is arranged in a vicinity of each of intersections of said scanning lines and said signal lines, and electrically connected to both of said scanning and signal lines;

a pixel electrode connected to each of said switching elements;

said scanning lines, signal lines, switching elements and pixel electrodes being formed on one of said substrates,

a common electrode formed on the other of said substrates so that said common electrode faces said pixel electrode with said liquid crystals therebetween;

a common line [for supplying a] <u>to which a</u> common signal [to said common electrode] <u>is applied</u>:

a pixel capacitance, one of electrodes of said pixel capacitance [formed by said pixel electrode] being connected to said common line; and

a dummy scanning line formed outside of one of said scanning lines located at an outermost position on either a scanning start side or a scanning end side of scanning signal, for producing a parasitic capacitance between said dummy scanning line and the pixel electrode connected to the scanning line located at the outermost position.

2. The liquid crystal display device according to claim 1, wherein said dummy scanning line is arranged at a pitch equal to a pitch of other adjacent scanning lines so that said pixel electrode is located between said dummy

scanning line and the scanning line located at the outermost position.

3. The liquid crystal display device according to claim 1, wherein an inter-layer insulating film is formed over said switching elements, scanning lines and signal lines, and each of said pixel electrodes overlaps said dummy scanning line and adjacent scanning line corresponding to said pixel electrode with said inter-layer insulating film therebetween.

4. The liquid crystal display device according to claim 1, further comprising signal input means for inputting a signal to said dummy scanning line.

5. The liquid crystal display device according to claim 4, wherein said signal input means inputs a signal to said dummy scanning line before an output of a scanning signal to be input to the scanning line located at the outermost position on the scanning start side of scanning signal.

6. The liquid crystal display device according to claim 4, wherein said signal input means inputs a signal to said dummy scanning line after an output of a scanning signal to be input to the scanning line located at the outermost position on the scanning end side of scanning signal.

7. The liquid crystal display device according to claim 4, wherein said signal input means inputs a scanning signal generated exclusively for said dummy scanning line to said dummy scanning line.

8. The liquid crystal display device according to claim 4, wherein said signal input means inputs to said dummy scanning line a scanning signal to be input to the scanning line located at the outermost position on either the scanning start side or the scanning end side of scanning signal.

9. The liquid crystal display device according to claim 4, wherein said signal input means inputs to said dummy scanning line the common signal to be input to said common electrode.

10. The liquid crystal display device according to claim 4, wherein said signal input means inputs to said dummy scanning line a scanning signal of a level which does not turn on said switching elements formed on said substrate.

11. A method of driving a liquid crystal display device including a plurality of scanning line to which scanning signals are successively applied, a plurality of signal lines to which data signals are successively applied, a switching element which is arranged in a vicinity of each of intersections of the scanning lines and the signal lines and connected to both of the scanning and signal lines, a pixel electrode connected to each of the switching element, a pixel capacitance formed by the pixel electrode, a common electrode which is arranged to face the pixel electrode, liquid crystals placed between the pixel electrode and the common electrode, and a dummy scanning line formed outside of one of the scanning lines located at an outermost position on either a scanning start side or a scanning end side of scanning signal to produce a parasitic capacitance between the dummy scanning line and the pixel electrode connected to the scanning line located at the outermost position, said method comprising the steps of:

supplying the scanning signal and the data signal to the switching element and supplying a common signal to one of electrodes of the pixel capacitance so as to change an electric potential between the pixel electrode and the common electrode and vary a transmittance of the liquid crystals; and

inputting a signal to the dummy scanning line.

12. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is output before an output of a scanning signal to be input to the scanning line located at the outermost position on the scanning start side of scanning signal.

13. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is output after an output of a scanning signal to be input to the scanning line located at the outermost position on the scanning end side of scanning signal.

14. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is a scanning signal generated exclusively for the dummy scanning line.

15. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is a scanning signal to be input to the scanning line located at the outermost position on either the scanning start side or the scanning end side of scanning signal.

16. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is the common signal to be applied to the common electrode.

17. The method of driving the liquid crystal display device according to claim 11,

wherein the signal to be input to the dummy scanning line is a scanning signal of a level which does not turn on the switching elements.

* * * * *